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German Patent Application No. 197 28 548 A1

SLOT COVER ON THE SHIFTING PATH OF A SELECTION LEVER FOR A VEHICVLE TRANSMISSION

Odysseus Andronis

UNITED STATES PATENT AND TRADEMARK OFFICE
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Date Laid Open to Public Inspection:	March 5, 1998
Internal priority:	196 28 630.1 July 16, 1996

SLOT COVER ON THE SHIFTING PATH OF A SELECTION LEVER FOR A VEHICLE TRANSMISSION

[Spaltabdeckung am Verstellweg eines Wählhebels für ein Kraftfahrzeuggetriebe]

Applicant:	Volkswagen AG
Inventor:	Odysseus Andronis

The invention concerns a slot cover on the shifting path of a selection lever for a transmission according to the preamble of Claim 1.

Especially in vehicles with automatic transmissions, a shift lever for the gears is guided through a slot in a cowling in the vehicle interior on the auto body side. The slot length and slot width then correspond to roughly one longitudinal shifting path and optionally a transverse shifting path of the selection lever. To avoid the drawbacks of an exposed slot connection between the vehicle interior and an underlying outside space, slot covers of different designs are already known.

A generic slot cover (US-4,964,359) comprises a slot cover element that covers a slot formed in a cowling on the auto body side as a selection lever recess in the direction and length of a longitudinal shifting path. A bushing is provided on the slot cover element, through which a selection lever shaft is passed for motion transfer, in which the slot cover element has at least a length corresponding to the slot length plus the maximum longitudinal shifting path, so that the

slot is covered in all longitudinal movements of the selection lever. The slot cover also has longitudinal guide elements arranged in the slot edge region on the cowling, in which the slot cover element is mounted longitudinally movable, the slot cover element being entrained by longitudinal displacement of the selection lever.

The slot cover element is then designed as a flexible band that can be wound and unwound on two spools by a spring bias. The spools are arranged in the direction of the longitudinal shifting path on opposite edge regions of the selection lever recess. Depending on the movement direction of the selection lever along the longitudinal shifting path, the spring-biased band is released from one spool and wound onto the other spool. The band is made from flexible plastic, metal mounts being applied along the longitudinal edges of the band to improve its sliding properties. The arrangement is complex, costly and prone to malfunction because of the rolling mechanism. The guide elements themselves are designed so that the band is only displaceable in the direction of the longitudinal shifting path and supported in the transverse direction. The selection lever is therefore movable only in the direction of the longitudinal shifting path, but not in the transverse direction, owing to the support function of the guide elements. Because of this, such a slot cover cannot be used in known selection lever shifts with gear shifting gates and transverse shifting movements.

A similar slot cover is known from DE-GM 71 32 167. A flexible slot cover element there also has a bushing for the selection lever, so that the slot cover element moves synchronously with the selection lever. The slot cover element is guided displaceably along the guide elements arranged in the edge region in the direction of a longitudinal shifting path and supported in the transverse direction, and therefore suitable only for a selection lever arrangement with exclusive longitudinal shifting. A symbol strip is connected to the slot cover element, so that symbols can be moved into a fixed window to display an engaged gear during longitudinal shifting.

Cover elements from strip-like plates are also known that are connected by so-called film joints (DE-AS 28 04 604). The cover element arranged fixed on two long ends is mounted so it can move by a zigzag arrangement of the plates in the direction of the longitudinal shifting path. If the driver moves the selection lever in a direction along the longitudinal shifting path, one end of the cover element is pushed together accordion-like, while the other end is more or less stretched. By fixing the slot cover element on the end, transverse shifting is not possible here either. The arrangement also acts as a dirt trap because of the plate intermediate spaces.

A slot cover element with plates in a window shade arrangement is also known, in which the plates are guided in guide elements in the direction of the longitudinal shifting path (DE-PS 30 25 152). Shifting in the transverse direction is not possible here either. The plates also act here as dirt traps.

A bearing for a shift lever in a vehicle with a gear box is also known (DE-OS 24 60 769), in which the shift lever is guided to pivot over an articulated ball, but is fixed in a ball cage. A slot with a slot cover is not present here.

For vehicles with gear boxes, an expansion bellows is often also provided as the slot cover, on which, however, dirt generally collects with time.

The task of the invention is therefore to modify a generic slot cover on the shifting path of a selection lever for a transmission, so that transverse shifting paths can also be covered in an optically attractive, cost-effective and dirt-insensitive fashion.

According to Claim 1, the selection lever shifting path has transverse shifting paths, in addition to longitudinal shifting paths, corresponding to a gear shifting gate. The longitudinal guide elements therefore have a free space for transverse displacement of the slot cover element according to the transverse shifting path of the selection lever. The guide elements are preferably designed integral with the cowling, for example, made from one piece by injection molding. The slot cover element also has at least a width corresponding to the slot width plus the maximum transverse shifting path, so that the slot is fully covered both during all longitudinal displacements and all transverse displacements of the selection lever. The free space for transverse displacements, in conjunction with longitudinal guide elements, is simple and inexpensive to implement, so that an optically attractive, dirt-insensitive cover is produced with appropriate choice of material for the cover element.

In a preferred variant, a selection lever bushing formed on the slot cover element, has a universal ball joint connected to the slot cover element and a mobile bearing ball mounted in it. The universal ball joint is then designed either integral on the slot cover element or inserted in it as a separate single- or multi-part annular piece. The bearing ball itself has a central through opening for a selection lever shaft of the selection lever, which is mounted to slide in it and is force-fit. Because of this, the selection lever shaft is displaceable relative to the bearing ball for length compensation in the different shift positions.

During longitudinal and/or transverse displacement of the shift lever, the slot cover element is then entrained via the bearing ball and the bearing ball mounting device with simultaneous length compensation between the selection lever shaft and the slot cover element, according to the shifting direction, with limited friction.

In an alternative variant, the selection lever bushing has a support element that is arranged integral or as a separate part on the slot cover element. This support element tapers and extends with an upper annular element in the direction toward an upper end of the selection lever shaft and encloses this in shape-mated fashion and is movable. A compensating sleeve is also arranged around the selection lever shaft, which is supported on the support element with a lower compensating sleeve end.

A selection lever sleeve is also arranged around the compensation sleeve and around the selection lever shaft in telescoping fashion and firmly connected to the selection lever shaft in an upper region. Because of this, during longitudinal and/or transverse displacement of the selection lever, the slot cover element is entrained over the support element according to the selection lever displacement. At the same time, the selection lever shaft, during such longitudinal and/or transverse displacement of the selection lever, can execute length compensation in the longitudinal direction of the selection lever. The length compensation occurs by relative movement between the selection lever sleeve and the compensation sleeve. In a particularly advantageous variant, a spring element for longitudinal biasing can be arranged between an upper selection lever sleeve end and an upper compensation sleeve end. Owing to the design with the support element, compensation sleeve and selection lever sleeve, a simple, smooth shifting with simultaneous longitudinal and transverse displacement of the slot cover element is possible between the selection lever shaft and the slot cover element. Such a design can also be used in a selection lever arrangement, in which the selection lever is movable only in the direction of a longitudinal shifting path.

In a particularly preferred variant, the slot cover element is designed as a flat and shape-stable shell element. The shell element has the shape of a longitudinal section of a cylindrical outer surface, at least in the longitudinal edge regions, and is aligned axially in the direction of the longitudinal shifting path of the selection lever. The shell element also lies with its longitudinal edges against the longitudinal edge regions of the selection lever recess on the bottom in shape-mated fashion. These longitudinal edge regions have the shape of a part of a cylinder according to the shell element longitudinal edges and form an upper part of a guide element, to which a guide element bottom is connected. A guide slot is formed between each guide element top and each guide element bottom to accommodate the shell element longitudinal edges, so that longitudinal guiding of the shell element, in conjunction with a transverse displacement, is provided. Because of this, it is ensured that the shell element is only movable in the direction of a longitudinal and transverse shifting path of the selection lever and cannot be rotated around a shifting lever longitudinal axis, which could lead to stiffness and possibly to jamming.

The shell element also consists of a wear-resistant material with good sliding capability and has a smooth, dirt-insensitive, optically attractive surface. As an alternative to this, the slot cover element can be a flat part that is shape-stable in the longitudinal direction and is flexible, at least in the regions of the longitudinal edges in the transverse direction. These longitudinal edges are accommodated in the longitudinal guide slots that form aligned longitudinal sections of a cylindrical surface in the direction of the longitudinal shifting path. Here again, no rotation of the

slot cover element around the selection lever longitudinal axis is possible but only displacement in the direction of the longitudinal and transverse shifting path.

In another alternative variant, the slot cover element is designed as an at least partially flat, annular, closed and flexible band. The band then fully covers, with its flat part, the selection lever recess in each selection lever position and is guided around at least two, preferably four, rod-like guide elements arranged in rectangular form. These guide elements run in the direction of the longitudinal shifting path of the selection lever. Two guide elements are arranged along the two edge regions of the selection lever recess. The flexible band can then be made fully flat or, for reasons of saving material and using possibly another selection lever bushing on a lower band section, can consist of a flat slot cover element with thin bands attached to it that are joined on the end edges, for example, stitched. During displacement of the selection lever in the longitudinal and/or transverse shifting direction, the band is then pushed, on the one hand, in the longitudinal shifting direction axially along the guide elements and, on the other hand, guided around the guide element in the transverse shifting direction.

The selection lever, in another variant, is also connected to a symbol strip with movement transfer. At least one fixed display window is formed over the symbol strip, preferably in the cowling, in which a symbol indicating the corresponding gear can be moved into the display window both during longitudinal and transverse shifting of the selection lever. The symbol indicating the corresponding gear can then be illuminated in known fashion.

The selection lever and therefore the slot cover can be arranged in known fashion on a central tunnel, a dashboard panel or a gearshift lug of a vehicle. In particular, the selection lever, the slot cover element and the guide elements can be integrated in a module that can then be inserted as a preassembled modular unit into a correspondingly allocated cowling section in the vehicle.

Practical examples of the invention are further explained with reference to the drawings. In the drawings:

Figure 1 shows a perspective view of a slot cover,

Figure 2 shows a cross section through a slot cover along line A-A in Figure 1,

Figure 3 shows a cross section for a second variant of a slot cover,

Figure 4 shows a cross section through a third variant of the slot cover, and

Figures 5-7 show a first, second and third practical example of a band-like slot cover element of the third variant according to Figure 4.

A perspective view of a slot cover 1 according to the invention is shown in Figure 1. The slot cover 1 is made on a cowling 2 with a slot lever recess 3. The slot lever recess 3 is fully covered by a shape-stable shell element 4, for example, made of neoprene, both during longitudinal shifting (arrow 13) and during transverse shifting (arrow 10) of the selection lever 6.

As can be deduced, in particular, from Figure 2, which shows a cross section along line A-A of Figure 1, the slot cover 1 has guide elements 5 in the region around the selection lever recess 3. A part of the cowling 2 that extends cylindrically in the longitudinal shifting direction forms a guide element top 7 of the guide element 5, to which a guide element bottom 8 of the guide element 5 is connected, which also extends, preferably at least partly, in the longitudinal shifting direction 13. A guide slot 9 is formed between the guide element top 7 and the guide element bottom 8. The shell element 4 is guided through this guide slot 9, having the shape of a longitudinal section of a cylindrical outer surface, so that it lies with its longitudinal edges 11 on the bottom against the longitudinal edge regions of the selection lever recess 3, formed as the guide element top 7 in shape-mated fashion. Free spaces 12 for a transverse displacement 10 of shell element 4 are also formed by this design of the guide elements 5.

In a center region of the shell element 4, the selection lever bushing 25 is formed, into which a one-part universal ball joint 14 is inserted. A bearing ball 15 is mounted to move in universal ball joint 14. The bearing ball 15 has a through hole 19 in its center, through which a selection lever shaft 16 of selection lever 6 is guided to slide in shape-mated fashion. The selection lever shaft 16 is then linked to a lower selection lever shaft end 17 on a bearing device 18.

During operation of the selection lever 6 in the direction of the transverse shifting path 10, the shell element 4 is entrained by the bearing ball 15 and universal ball joint 14 according to the movement direction of the selection lever 6 and pushed into one of the free spaces 12. The shell element 4, during operation of the selection lever 6 in the direction of the longitudinal shifting path 13, is also entrained and correspondingly pushed via the bearing ball 15 and ball cage 14. At the same time, because of the slide bearing of selection lever 16 in bearing ball 15, a length compensation of the selection lever 6 occurs during each movement of the selection lever 6 in either the longitudinal shifting direction 13 or transverse shifting direction 10.

A second variant of the slot cover 1 is shown in Figure 3. The slot cover element is designed as a flexible flat part 20, shape-stable in the longitudinal direction and flexible in the regions of the longitudinal edges 21. The guide elements 22 enclose a cylindrical guide element top 23 and a correspondingly connected guide element bottom 24. The guide element tops 23 are designed integral with a cowling 2 that runs horizontally around the selection lever recess 3. A longitudinal guide slot 37 is also formed between each guide element top 23 and each guide element bottom 24, through which the flat part 20 can be moved into one of the free spaces 12 during transverse shifting 10.

In addition, a selection lever bushing 26 is formed in the depiction of Figure 3 in a center region 27 of flat part 20. The selection lever shaft 16 is then guided through an opening 28 of flat part 20 and surrounded in the region of this opening 28 by a support element 29 that is arranged

fixed on flat part 20. The support element tapers and extends with an upper annular element 30 in the direction toward an upper end 31 of selection lever shaft 16 and encloses this in shape-mated fashion, so that it is guided to move in it.

A compensation sleeve 32 is also provided around the selection lever shaft, which is supported with a lower compensation sleeve end 33 on the upper annular element 30 of the support element 30 [sic; 29]. A selection lever sleeve 34 is arranged telescoping around the compensation sleeve 33. An upper selection lever sleeve end 35 is connected fixed to the upper end 31 of the selection lever shaft 16. A spring element 36 is also provided between the upper selection lever sleeve end 35 and an upper compensation sleeve end 47 of the compensation sleeve 32.

During transverse shifting 10 of selection lever 16 of a slot cover 1 according to the practical example of Figure 3, the flat part 20 is entrained by the support element 29 and pushed into one of the free spaces 12, in which the flexible longitudinal edges 21 match the cylindrical shape of the guide slot 37.

The flat part 20, during longitudinal shifting 13 of selection lever 16, is also entrained via the support element 29 and correspondingly shifted. At the same time, because of the slide bearing of the selection lever shaft 16 in support element 29, in cooperation with the compensation sleeves 32 and the selection lever sleeve 34 during each movement of the selection lever 6 in either the longitudinal shifting direction 13 or transverse shifting direction 10, a length compensation of selection lever 6 occurs. The length compensation occurs because of the relative movement between the selection lever sleeve 34, arranged fixed on selection lever shaft 16, and the compensation sleeve 32. A longitudinal biasing occurs because of spring element 36.

In another alternative variant, which is only shown with dashed lines in the depiction in Figure 4, a flexible band 44 is guided only around the two upper guide elements 39, 40. To avoid an additional selection lever bushing on the lower section of band 44, the band 44 consists of a flat upper band section 46 that covers the selection lever recess 3 in each selection lever position and thin bands 45 attached to it, in which the bands, according to the practical example in Figure 6, are mounted in the manner of suspenders and/or have only a thin band 45, according to the practical example in Figure 7.

The bands, as is apparent from Figure 4, are stitched to each other on their ends to form an annular shape.

During operation of the selection lever 6 in the direction of the transverse shifting path 10, the band 38 or 44 is then entrained via the bearing ball 15 and bearing cage 14 during simultaneous length compensation of selection lever 6 according to the movement and guided around the guide elements. The band 38 or 44 is also pushed to slide in the direction of the longitudinal shifting path 14 via guide rods 39-42 during operation of selection lever 6.

Claims

1. Slot cover on the shifting path of a selection lever for a transmission, with a cowling on the auto body side with a slot as a selection lever recess in a direction and length of a longitudinal shifting path, with a slot cover element with a bushing, through which a selection lever shaft of the selection lever is guided for movement transfer, in which the slot cover element has at least a length corresponding to the slot length plus the maximum longitudinal shifting path, so that the slot is characterized by the fact that

the selection lever shifting path also has a transverse shifting path (10), in addition to the longitudinal shifting path (13), corresponding to a gear shifting gate,

longitudinal guide elements have a free space (12) for transverse displacement of the slot cover element (40, 20, 38, 44), corresponding to the transverse shifting path (10) of the selection lever (6), and

the slot cover element (4, 20, 38, 44) has at least a width corresponding to the slot width plus the maximum transverse shifting path, so that the slot (3) is also fully covered during all transverse displacements.

2. Slot cover according to Claim 1, characterized by the fact

that the selection lever bushing (25) on the slot cover element (4, 20, 38, 44) comprises a bearing ball mounting device (14) connected to it and a bearing ball (15) inserted in the bearing ball mounting device (14), and

that the bearing ball (15) has a through hole (19) in its center for sliding and shape-mated mounting of the selection lever shaft (16), so that the selection lever (16) is guided movable in it for longitudinal compensation in the selection lever longitudinal direction.

3. Slot cover according to Claim 1, characterized by the fact

that the selection lever bushing (26) comprises a support element (29) that is arranged fixed on the slot cover element (4, 20, 38, 44) and tapers with an upper annular element (30) in the direction toward an upper end (31) of the selection lever (16) and encloses it in a shape-made and movable fashion,

a compensation sleeve (32) is arranged around a selection lever shaft (16) and is supported on the support element (29) with a lower compensation sleeve end (33) and

a selection lever sleeve (34) is arranged around the compensation sleeve (32) and around the selection lever shaft (16) in telescoping fashion and firmly connected to the selection lever shaft (16) in an upper region.

4. Slot cover according to Claim 3, characterized by the fact that the spring element (36) is arranged between an upper selection lever sleeve end (35) and an upper compensation sleeve end (47) for longitudinal biasing.

5. Slot cover according to one of the Claims 1 to 4, characterized by the fact

that the slot cover element is designed as a flat, shape-stable shell element (4) that has the shape of a longitudinal section of a cylindrical outer surface, at least in the longitudinal edge regions (11), and is aligned axially in the direction of the longitudinal shifting path (13), and

the shell element (4) with its longitudinal edges (11) lies in a shape-mated fashion on the bottom against the longitudinal edge region of the selection lever recess (3), and the longitudinal edge regions have a corresponding partial cylindrical shape as top (7) of a guide element (5) with a corresponding guide element bottom (8), in which the guide element type (7) and the guide element bottom (8) for a guide slot (9) accommodate the shell element and longitudinal edges (11), so that longitudinal guiding of the shell element (4) is obtained in conjunction with a transverse displacement.

6. Slot cover according to one of the Claims 1 to 4, characterized by the fact

that the slot cover element is a flat part (20) that is shape-stable in the longitudinal direction and flexible in the transverse direction, at least in the regions of the longitudinal edges (21), and

these longitudinal edges (21) are accommodated in longitudinal guide slots (37) that form longitudinal sections of a cylindrical shape aligned in the direction of the longitudinal shifting path (13).

7. Slot cover according to one of the Claims 1 to 4, characterized by the fact that the slot cover element is designed as an at least partially flat, annular, closed and flexible band (38, 44) that covers the selection lever recess (3) in each selection lever position with the flat part (46) and is guided by at least two rod-like guide elements (39, 40, 41, 42), aligned in the direction of the longitudinal shifting path and along the edge region of the selection lever recess (3).

8. Slot cover according to Claim 7, characterized by the fact that four rod-like guide elements (39, 40, 41, 42) are arranged in the rectangular shape, when viewed in the longitudinal direction, around which the flexible band (38, 44) is guided.

9. Slot cover according to one of the Claims 1 to 8, characterized by the fact that a symbol strip is connected with movement transfer to the selection lever (4, 20, 38, 44), in which at least one fixed display window is formed above the symbol strip, preferably in the cowling (2), so that a symbol indicating the correspondingly engaged gear can be moved into the display window both during a longitudinal displacement (13) and during a transverse displacement (10) of selection lever (6).

10. Slot cover according to one of the Claims 1 to 9, characterized by the fact that the cowling (2) with the selection lever recess (3) is a part of a central tunnel and/or dashboard panel and/or gear lug.

11. Slot cover according to Claim 9, characterized by the fact that the selection lever (6), the slot cover elements (4, 20, 38, 44) and the guide elements (5, 22, 39, 40, 41, 42) are

integrated in a module that can be inserted as a preassembled module unit into the allocated cowling section.

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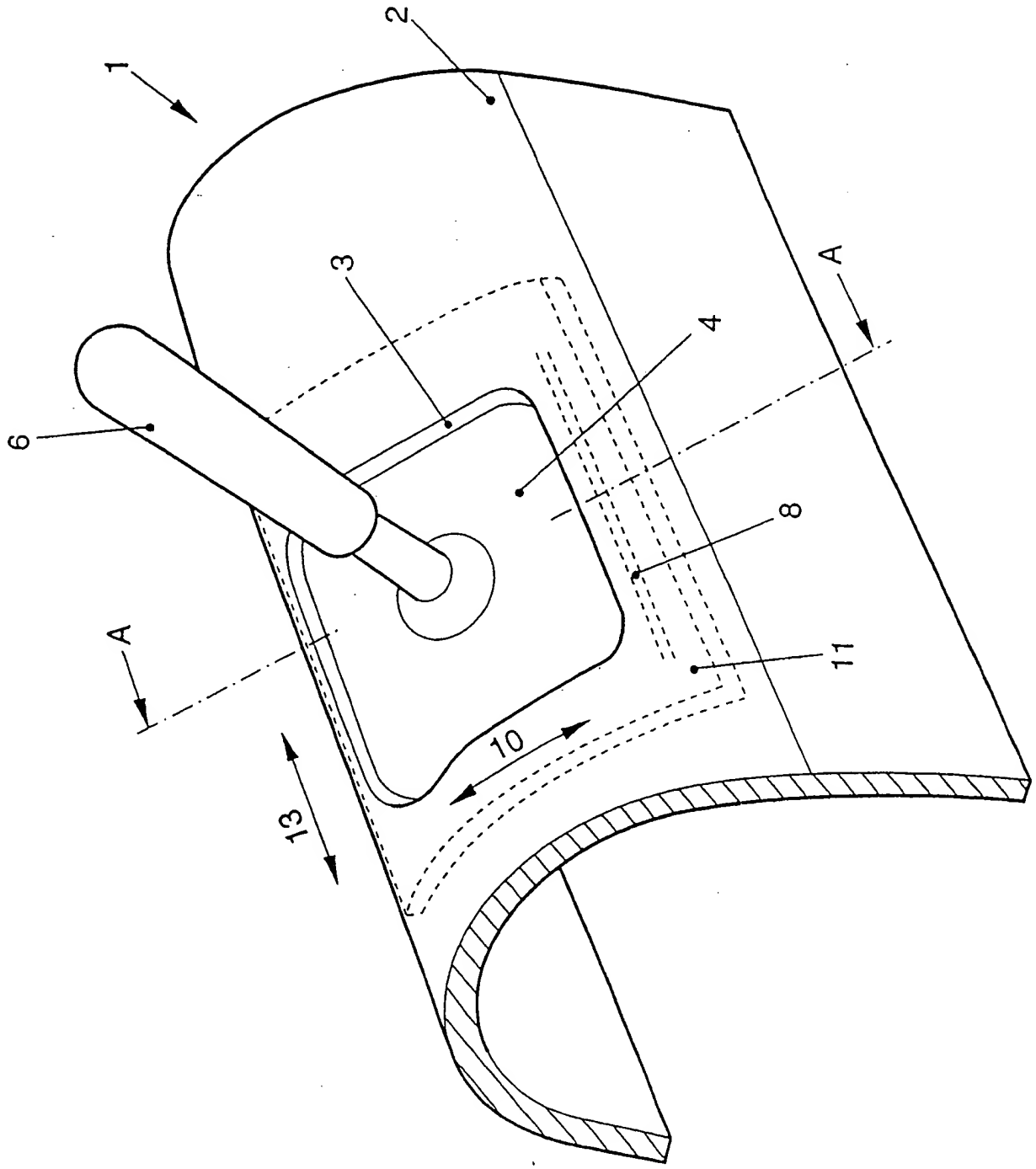

FIG. 1

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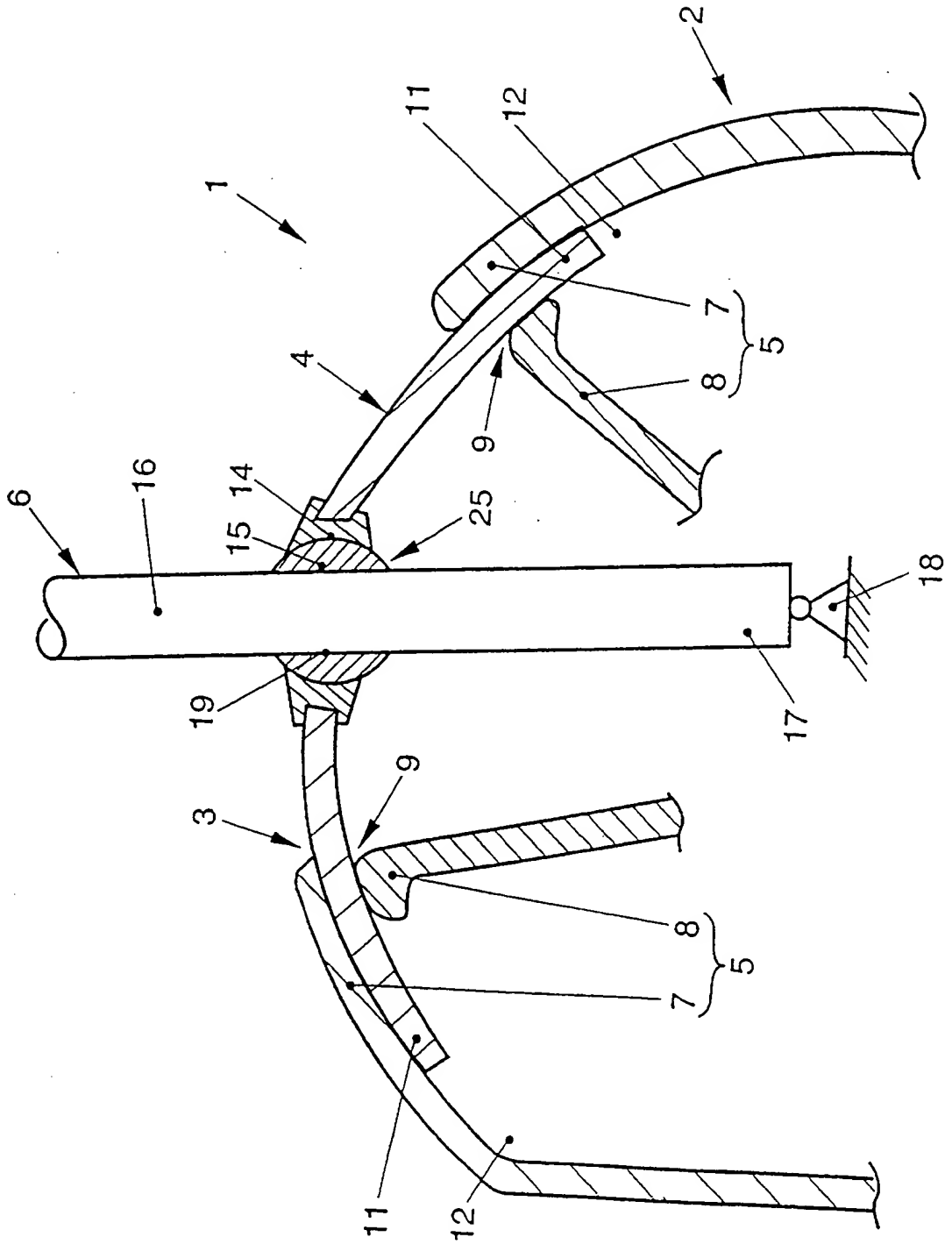

FIG. 2

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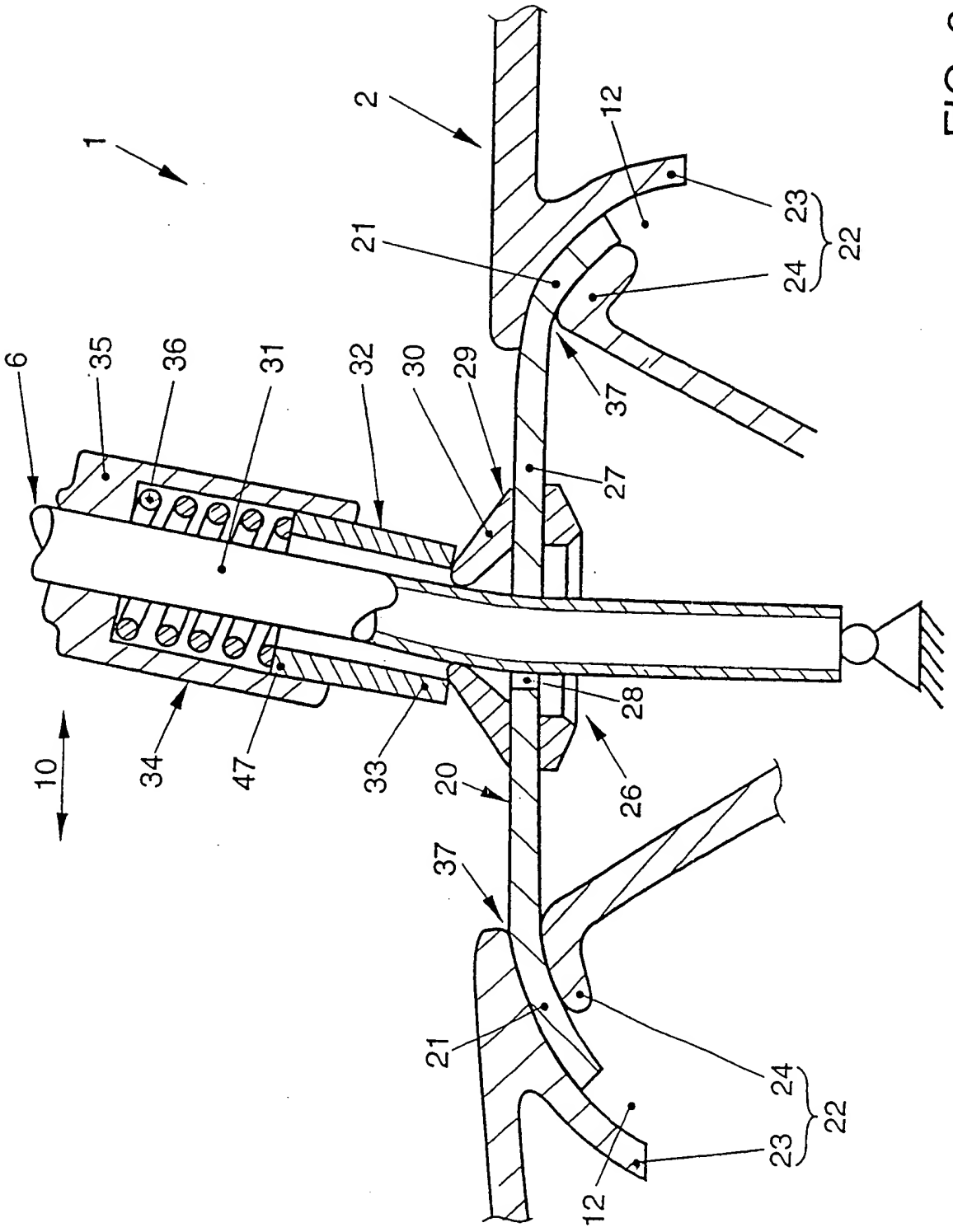
FIG. 3



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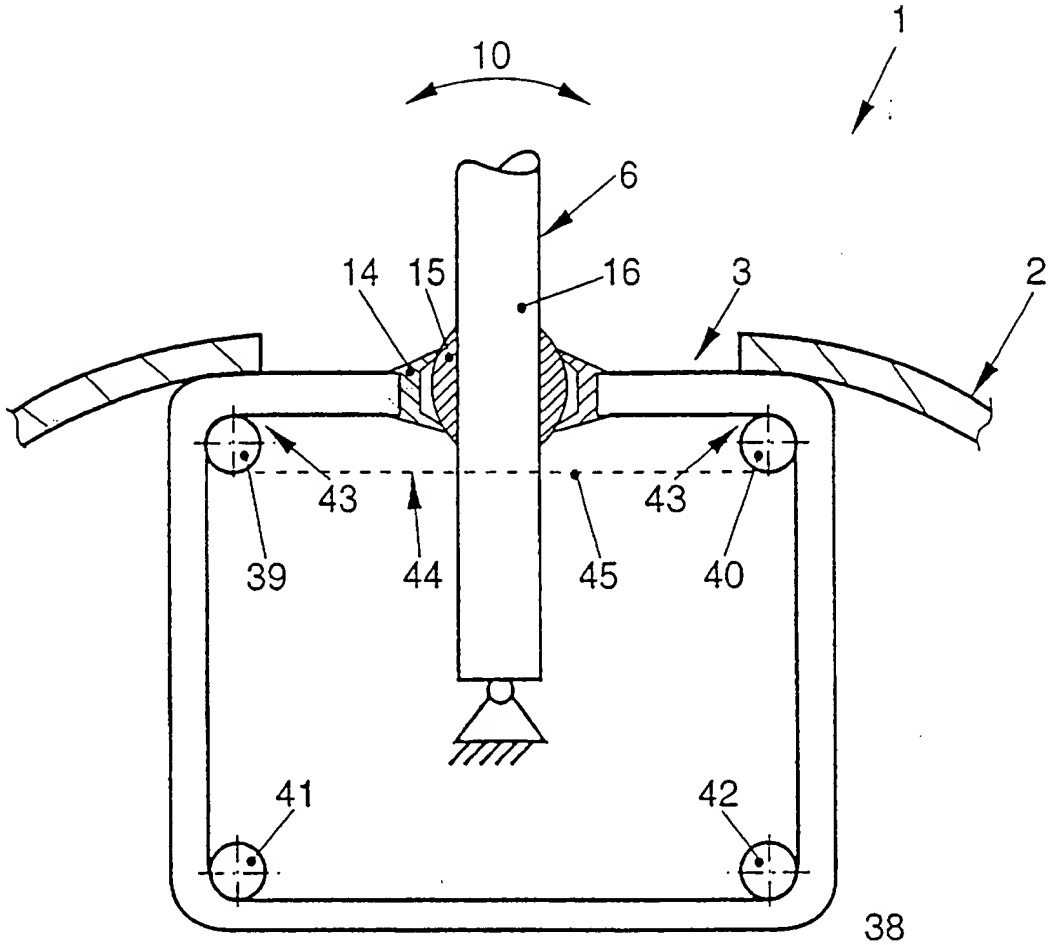

FIG. 4

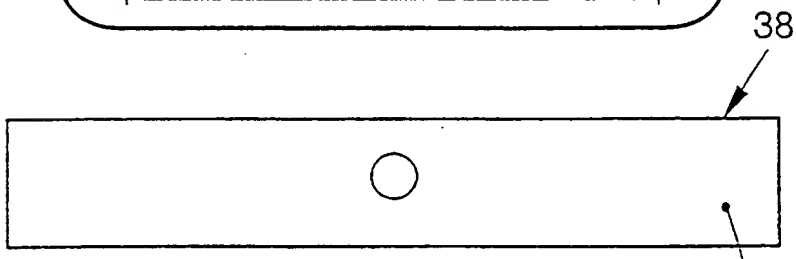

FIG. 5

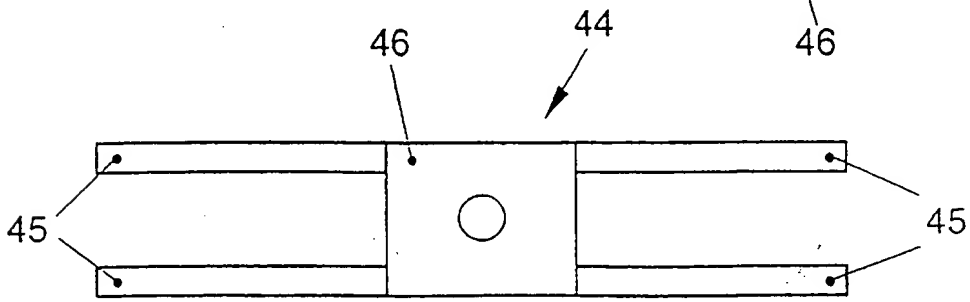

FIG. 6

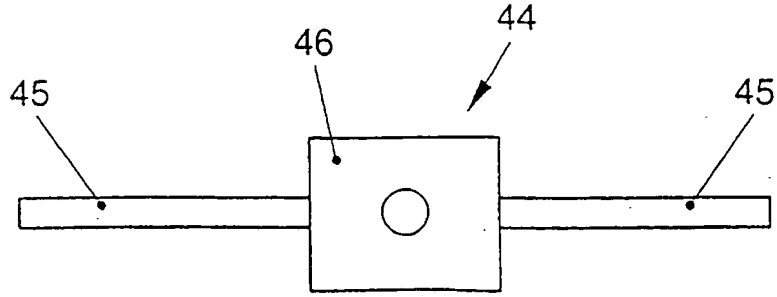

FIG. 7